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STUDY OF SOME BACTERIOLOGICAL AND IMMUNOLOGICAL PARAMETERS IN URINARY TRACT INFECTION OF PREGNANT WOMEN

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ABSTRACT

Methods: One hundred and fifty urine and blood specimens are collected from pregnant women infected by urinary tract infections from the maternity hospital in Arbil and Al-Alwaiya hospital for maternity in Baghdad for the period time from December 2012 to March 2013, the samples are taken from pregnant women with age ranging 20 to 35 years , as it has been to isolate and identify Gram-negative bacteria from urine samples of pregnant women with UTI in addition to study the effect of the third trimesters of pregnancy on the incidence of the infection during pregnancy. The results showed different bacterial isolates with different percentage.

Diagnoses of these isolates by microscopic examination and by using biochemical tests, Api 20 E and Vitek2 system , knowing their sensitivity toanti-bacterial antibiotics, also serotyping classification of the bacteria *Pseudomonas aeruginosa*, study of some immunological parameters of serum pregnant women included measurement of level antibodies (IgG, IgM, IgA) and level of complement (C3,C4) by using single radial immune diffusion method (SRID) the study also included measurement of level of C-Reactive Protein for pregnant women with UTIs.

Results: One hundred and eight pregnant women are infected by different Gram-negative bacteria Characterized (53) isolates *Eschirchiacoli* then followed by in second rank (23) isolates *Acinetobacterbaumannii*, (14)isolates *Klebsiellapneumoniae*, (12) isolates for *Proteusmirabilis*and later(6) isolates for *Pseudomonas. aeruginosa.* Forty-two(42)of pregnantwomenshow absence of any bacteria linfections. Examine the sensitivity of antibiotics for each bacterial isolates causes of urinary tract infectionin pregnant women showed high resistance to both ciprofloxacin (86.5%) and also Trimethoprim(79.3%), while the study showed low resistance for each ofTobramycin (21.3%) and also Norfloxacin (23.7%). Multiple serotypes of *P. aeruginosa* (O:11, O:9, O:11, O:11, O:9 and O:10) for each (P1, P2, P3, P4, P5 and P6) respectively , confirm different distribution and frequent spread of serotypes.

High levels of immunoglobulines for IgG(2180.6 ± 28.4), IgM(286 ± 7.2), IgA (503.3 ±12.4) where there are significant differences at $P<0.05$ compared with control.

High levels of complement factor for each of C3(204.3 ±7.9) and high C4(53 ± 2.8) showed the existence of significant difference sat $P<0.05$when compared with the control.

An increase in the normative pregnant patients for C-Reactive Protein show edanincrease as months of pregnancy period progress and the differences appeared highly significant at $P<0.01$ in the last three months of pregnancy, while significant differences were lowe rat $P<0.05$ for each of the first six months of pregnancy.

KEYWORDS: Urinary Tract Infection, pregnant women, sensitivity test ,immunological parameters.

Introduction

Urinary tract infections (UTIs) are one of the human infectious diseases caused by bacterial infection that affects any part of urinary tract. Classifications of UTIs depend on the site of colonizing the lower or upper urinary tract, When it affects the lower urinary tract it is known as a simple cystitis (a bladder infection) while if affects the upper urinary tract is known as pyelonephritis (a kidney infection) (1).

Urinary tract infections (UTIs) are one of the most common conditions seen in female patients in general practice. Women have a higher risk of developing a UTI than men due to short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora (2).

Pregnant women are at risk for increasing incidence of UTI at the beginning of 6^{th} in week and peaks during weeks 22 to 36 of pregnancy due to a number of factors including uterus sits directly on top of the bladder and displaces it; shift in the position of the urinary tract and hormonal changes during pregnancy make it easier for bacteria to travel up the urethras to the kidneys. Also urethral dilatation, increased bladder volume and decreased bladder tone, along with decreased urethral tone which contributes to increased urinary stasis and ureterovesical reflux and up to 70 % of pregnant women develop glycosuria, which encourages bacterial growth in the urine (3).

UTI may manifest as asymptomatic bacteriuria (ASB) or symptomatic bacteriuria (SB) , in many cases, pregnant women with positive urinary tests have no symptoms of UTI and presence of bacteria in urine without symptoms is known as an asymptomatic bacteriuria and presence of leukocytes in urine is called pyuria (4). Predominant organisms that cause the UTIs during pregnancy are the E.coli, it is responsible for 80 %–90 % of infection Studies revealed that immune defenses prevent infection if its non specific immunity or specific, but in spite of these safe guards, infections is still occurs (5).

The non specific innate immunity against an infection in the bladder or kidneys, consists primarily of local inflammation, while specific immunity is followed by an adaptive immune response characterized in part by antibody response to the infecting bacte-

ria, in addition to cell-mediated immune response. Urinary tract infections will be spontaneously resolved in most cases, children and women who do not get UTIs are most likely to have normal levels of immunoglobulin's in their genital and urinary tract.

This work was aimed to study the effect of age and trimesters of pregnant women which may increase the incidence of UTI, determination the serotype of P. aeruginosa which is related to UTIs and Serological investigations which include: Immunoglobulin, C-reactive protein and Complement concentration in pregnant women who are suffering from UTI and compare with are not suffering from UTI.

Methods

Samples collection.

One Hundred and fifty samples of serum and urine are collecting from pregnant women according to third trimesters (table-1), which were suspected that infected in UTI and have certain clinical symptoms , These samples collected from Erbil maternity Hospital and Alwaiya for maternity Hospital in Baghdad, during the period from (December- 2010 to March- 2013) with age ranging from 20-35 years, under physian gynocology consultants .

Table 1: Trimesters period of pregnant

Trimesters	Period of pregnant in weeks
First Trimesters	4-12
Second Trimesters	16-24
Third Trimesters	28-36

Urine Examinations

General urine examination (G.U.E) was done according to Forbes *et al*., (6), while urine culture was done according to (7).

Isolation and Identification of bacteria

Bacteria isolated as pure colonies on MacConky agar and then isolates were examined microscopically by using Grams stain technique for referred to as Gram-positive or Gram-negative bacteria (8).

Culture characteristics

Colonies of the bacterial isolates that cultured on blood agar and MacConky media were described according to their shapes, color, diameter, odor, and other characteristics (9).

Biochemical tests

The biochemical tests which performed for the identification of bacteria were carried out according to (6)

Diagnostic kit (API 20E)

Confirmative identification tests of bacterial isolates was performed using api 20E system for Enterobacteriaceae (manufactured by BioMérieux/France) according to the procedure suggested by the manufacturing company.

Diagnostic by (GN ID Card) Vitek-2

Bacterial isolates were identified at species level by using Vitek-2 system (Bio-Merieux/ France), using ID-GNB cards according to the manufacturer's instructions.

Antibiotic susceptibility test

The Antibiotic susceptibility test was performed according to Kirby-Bauer (disk diffusion) technique (5), using Muller-Hinton agar and different single antimicrobial discs supplied commercially (table -2).

The resulting zones of inhibition were measured by a ruler and compared with the zones of inhibition determined by Franklin *et al*., (10).

Table 2: Antibiotic discs used in this study.

Antibiotics	Code	Concentration µg/disk	Company and origin
Amoxicillin/ Clavulanic acid	AMC	20/10µg	Bioanalyse (Turkey)
Amikacin	AK	30µg	
Cefotaxime	CTX	30µg	
Norfloxacin	NX	10µg	
Ciprofloxacin	CIP	5µg	
Nalidixic acid	NA	30µg	
Tobramycin	TB	10 µg	
Gentamicin	GEN	10µg	
Nitrofurantoin	F	300 µg	
Trimethoprim/ Sulfamethoxazole	TMP	1.25/23.75 µg	

Serotyping of *Pseudomonas aeruginosa*

P. aeruginosa was serotyped according to the system of (11). *P. aeruginosa* have antiserum against somatic antigen (O) polyvalent (PM) in English letteres and monovalent in English numbers as follow: PMC (9, 10, 13, 14), PMF (7, 8, 11, 12) and PME (2, 5, 15, 16).

Slide agglutination test

Pseudomonas aeruginosa isolates were cultured on to MacConkey agar at 37°C for 18-24 hours. Slide agglutination technique was carried out according to (12).

Radial Immunodiffusion test

Single Radial Immunodiffusion (SRID) test were used for the quantitative determination of many human serum proteins such as IgA, IgG, IgM and C3, C4 complements.

The sera were removed from freezing and equilibrated to room temperature. Partigen plates were getting refrigerator then ziplock bag and lid removed, wells were inspected for moisture. If moisture was present, uncovered plates were allowed to remain at room temperature (approximately 15 minutes) until moisture evaporated.

Sera of patients and control were shaken (in their own containers) by inversion, each sample was dispensed on to the wells. Each well required 5µl of serum. After lid was replaced, it was incubated at room temperature 26°C on a level surface. incubation times were 48 hours for IgG, IgA, C3 and C4 tests and 72 hours for IgM tests. Immunopreciptin ring diameters were measured by hand lens (0.1 mm precision). The calculated diameters were compared to the standard diameter to conclude the concentrations of serum humoral factors (13)

C-Reactive protein (CRP)

The principle of CRP

C.R.P reacts when present in serum, it can react with the IgG coated latex particles, agglutination will occur, Starting with the formation of a web between them. Then the latex reagent is mixed with the serum, a clear agglutination appears if the serum contains approximately more than 6mg/l of C-reactive protein. (13).

Method

Fifty µl of the serum was placed on one section of the disposable slide, then Place a drop of reagent next to the drop of serum, mix both drops with a wooden stick covering the whole surface of the slide section, after that gently rotate the slide for 2 minutes or on a rotary shaker (80-100 rpm). Look for the presence or absence of agglutination.

Statistical analysis:

Data were translated into a computerized database structure. Statistical analysis was computer assisted using SPSS (Statistical Package for Social Sciences) 2010,version 17.The charts were done by using curve estimation system (the quadratic mode).

The statistical significance of association between two variables within the same group was assessed by Chi-square.LSD was used in comparison between two different groups. p-value less than 0.05 was considered statistically significant.

Results and discussion

Incidence of UTI in pregnant women

Urine samples from one hundred and fifty pregnant women of different trimester were collected. Their ages ranging from 20 to 35 years. The results have showed that 108 (72 %) of urine samples contained heavy and appreciable bacterial growth while 42 (28 %) of samples had no appreciable bacterial growth as demonstrated in table -3.

This study agrees with cases of UTI in Iraq as mentioned by AL-Tememi et al. (14) and Shazia et al. (15) in India when they reported that incidence of UTI in pregnant women were 63.9% and 76.56% respectively.

The relationship of urinary tract infection with the age of patients was investigated in this study and the patients were grouped into three categories according to their age as shown in table -3.

The results have showed that higher percentage of pregnant women 47(43.5%) with UTIs within the age ranged 31-35 years and higher percentage of pregnant women 44(40.7%) with UTIs within the age of 26-30 years, while the lowest percentage is 17(15.8 %) with UTIs within the age 20-25 years. The highest number of bacterial isolates were obtained from pregnant women within the age of 31-35 and 26-30 years, lower number of bacterial isolates was obtained from age 20-25 years as shown in table -3.

Table 3: Distribution of incidence of UTIs in relation to age of pregnant women

Age group (year)	Number of cases		Positive patient		Negative patient	
	No.	%	No.	%	No.	%
20-25	32	21.3	17	15.8	15	35.7
26-30	52	34.7	44	40.7	8	19
31-35	66	44	47	43.5	19	45.3
Total mean	150	100	108	100	42	100

The results in table -4 showed that the highest percentage of UTIs was 37.9% in first pregnancy, followed by 34.3% in 2nd pregnancy and the lowest percentage incidence of UTI was 27.8% in 3rd pregnancy, the current study also showed that women in their first pregnancy have had a greater number of UTI cases, and frequent number of pregnancy may considered as a possible factors affecting the incidence and prevalence rate of UTIs among pregnant women. Okonko et al. (16) reported that the highest percentage of UTIs appeared in 2nd pregnancy and 3rd pregnancy and above by 43.7% and 58.3% respectively and this does not agree with the results of the current study.

Table 4: The relationship between Incidence of UTI and number of pregnancy.

No .of pregnancy	No. tested		No. positive	
	No.	%	No.	%
1st pregnancy	50	33.3	41	37.9
2nd pregnancy	44	29.4	37	34.3
3rd pregnancy and above	56	37.3	30	27.8
Total mean	150		108	72

In the current study it was found that the incidence of UTI by trimester showed that women in their 2nd and 3rd trimester had a greater number of UTI cases having an incidence of 35.2% and 46.2% respectively show in Table -5, women in their first trimester show fewer in number, had no specific bacterial growth and shows no sign of UTI, this shows that the incidence of UTIs among pregnant women could also be contributed by trimester.

Table 5: Incidence of UTI by trimester of pregnancy.

Trimester The period in (weeks)	No. tested		No. positive (%)	
	No.	%	No.	%
First trimester (4-12)	30	20	20	18.6
Second trimester (16-24)	51	34	38	35.2
Third trimester (28-36)	69	46	50	46.2
Total mean	150		108	72

This results agreed with Alemu *et al.* (17) and Okonko *et al.* (16) who found that the high percentage in 2nd and 3rd trimester of pregnancy by (10.8% and 12.5%) and by (41.4% and 55.1%) respectively.

Isolation and Identification of some Gram-negative bacteria from urine of pregnant women

Results was explained in Table -6, out of 108 positive result of specimens of urine from pregnant women, 53 bacterial isolates (49%) were primary identified as *Escherichia coli*. The second bacterial genus, which comesat the second class after the *E. coli* is *Acinetobacter baumannii*. A total of 108 positive results , 23 isolates (21.3%) were identified as *A. baumannii*. According to available information about *A. baumannii* local isolates from UTI, in this study *A. baumannii* is firstly isolated from UTI in pregnant women, So it is very necessary to find the source of *A. baumannii* by following the infection of urinary tract in pregnant women because this bacteria is an important opportunistic pathogen responsible for a variety of nosocomial infections, including urinary tract infections outbreak in pregnant women, because of the multidrug resistance and tendency to spread in hospital population, *Acinetobacter* has a special clinical significance, requiring epidemiologic monitoring as a measure for control of nosocomial infection (18).

The genus *Klebsiella pneumonia* fromed 14 isolates (12.9%), this bacteria were represent the third class after *E. coli* and *A. baumannii*. On the other hand, the percentage of bacteria *Proteus mirabilis* from 108 positive results is 12 isolates (11.2%),which means it was in fourth ranked after *Klebsiella* which represent the fourth group. *Pseudomonas aeruginosa* which was in (5.6%) 6 isolates of positive cultured, it was appeared the lowest percentage from 108 positive culture (Figure-1). Recorded infection rates of urinary tract by *P. aeruginosa*

clear decline as compared with infection by *E. coli* , In a study for the diagnosis of bacteria that cause urinary tract infection in Basrah, found that *E. coli* is the main cause of urinary tract infection then come *Klebsiella* and later *P. aeruginosa* which they(52.12%), (16.98%) and (7.1%) respectively by AL-Tememi *et al*. (14). This study also dissagree with the study of Al-Neiami, (19) which the percentage of isolated *P. aeruginosa* from urine (28.8%). This bacteria causes disease in humans with abnormal host defense and isolated mainly from patients with nosocomial UTI (20).

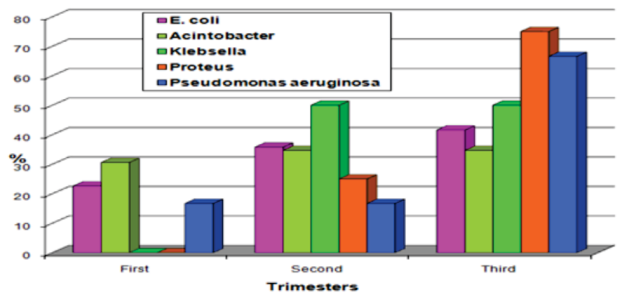

Figure (1)---- Percentage distribution of bacteria according to Trimesters

Antimicrobial susceptibility test for Gram-negative bacteria isolated from UTI in pregnant women

Antibiogram profile was performed to show the effect of some antibiotic on the bacterial isolates by using Bauer-Kirby Method. The antimicrobial susceptibility test of all the isolates to different antibiotics was determined by the disk diffusion method as recommended by the Clinical and Laboratory Standards Institute CLSI (21). The figure -2 shows that the highest resistant antibiotic is Ciprofloxacin and Trimethoprim / sulfamethoxazole for (86.5%) , (79.3%) respectively , this dissagree with the study of Alkubasiy, (22) and AL.Tememi *et al*. (14). While results show from the figure that the lower resistant antibiotics is Tobramycin and Norfloxacin for (21.3%) , (23.7%) respectively. These bacterial isolates showed different susceptibility towards ten antimicrobial used.

Antibiotic resistance has become an increasingly pressing clinical issue in many countries (23). Uropathogenic bacteria can resist the antibiotics by one or more of the following mechanisms (20): Alteration premeability of bacterial cell membrane to prevent drugs input, or pushing them out of the cell by efflux pump mechanism, like with Aminoglycosides antibiotics, and Alteration the target molecules of the antibiotic (e.g. the subunit 30s of the ribosome is the target of Aminoglycosides), other mechanisms is Alteration of metabolic pathway that antibiotics can interfere, like with Trimethoprime.

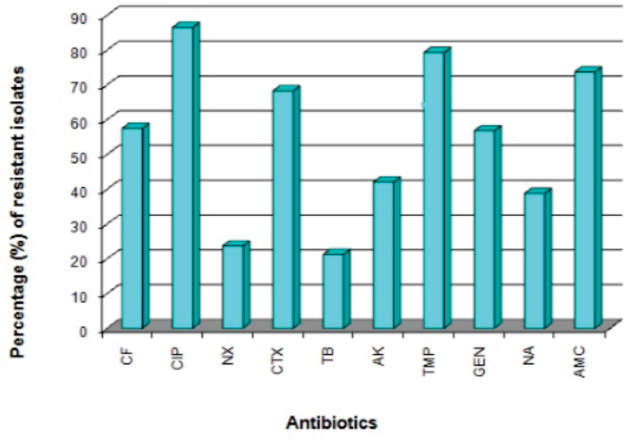

Figure (2) Percentage of resistant isolates to antibiotics

***Pseudomonas aeruginosa* Serotypung**

In table -6, the results have showed different serotypes of *P. aeruginosa* isolated from pregnant women infected with UTIs with six isolates termed from (P1, P2, P3, P4, P5, P6) have serotypes (O:11, O:9, O:11, O:1 , O:9 and O:10) respectivel, according to Habs, (11) system of serotyping. The present results agree with the results of Essa *et al*. (24) which isolated *P. aeruginosa* serotypes (O:11),and it more predominant serotype present in the Iraq . While *P. aeruginosa* serotypes (O:10) and (O:8) are low spreading serotypes, So these differences in serotypes confirm epidemic of *P. aeruginosa* serotype (O:11) and the presence of other serotypes in different enviromental conditions because this bacteria cause many infections in humans with abnormal host defense mechanisms or patients with nosocomial UTI (20). From the previous results, we indicate that the prevalent serotype is the most resistant to a number of antibiotics. Serological classification is concentrated as an indicator of the epidemic spread of these bacteria in hospitals and profound injuries events after surgery and burns (25).

Table -6: Serotyping of *P. aeruginosa*

Serotypes	*P. aeruginosa* isolates
O:11	P1
O:9	P2
O:11	P3
O:11	P4
O:9	P5
O:10	P6

The Immunoglobulines concentration in UTIs pregnant women.

The results in table (7) show the mean concentrations of IgG, IgM, IgA for each of positive patients (pregnant women with UTIs) and negative patients (pregnant women without UTIs) according to the trimesters of pregnancy. The results in the case of positive patients that the mean concentration for IgG , IgM and IgA as shown in figure (3) are (2180 ± 28.4), (286 ± 7.2) and (503.3 ± 12.4) respectively , showed significant differences at $P<0.05$ in compare with the mean of negative patients .In the case of negative patients which the mean concentration for each IgG, IgM, IgA are (1430 ± 24.6), (189 ± 6.3) and (288.3 ± 7.9) respectively. This mean that in the case of urinary tract infections in pregnant women the results appeared high in mean concentration for each IgG and IgM according to the results in table (7) which shows that the mean of IgG in the first trimester is (1988 ± 21.5) mg/dl as compare with the second and third trimesters which is lower than the mean concentration of IgG in the second and third trimesters (2110 ± 27.9) mg/dl, (2444 ± 33.5) mg/dl respectively, the highest of IgG mean concentration in the second and third trimesters mean that the UTIs incidence occur may be in all trimesters but not at one time . In relation to the mean concentration of IgM , the results have showed in table (7) at the first trimester is (312 ± 8.6) mg/dl which is higher level than the IgM mean in the second and third trimesters which is (280 ± 8.1) mg/dl and (266 ± 7.6) mg/dl respectively, as shown in table (7), this means that the incidence of UTIs in pregnant women is occurs for the first time in the early pregnancy (first trimester). Results of negative patients (there is no bacterial growth) the mean concentration for each IgG , IgM , IgA, is low as shown in table (7) there is no rise in the mean for each of them as compare with control .

Table -7: Immunoglobulin means concentration mg/dlin positive patients(with bacterial growth) and negative patients (without bacterial growth)

Trimesters	Positive patient							Negative patient						
		IgA		IgG		IgM			IgA		IgG		IgM	
	No.	mean	SD	mean	SD	Mean	SD	No.	mean	SD	mean	SD	mean	SD
First trimesters	23	512 ± 12.6 a		1988 ± 21.5 b		312 ± 8.6 c		10	220 ± 7.4		1455 ± 17.3		124 ± 5.4	
Second trimesters	37	505 ± 11.8 a		211 0 ± 27.9 b		280 ± 8.1 c		13	288 ± 8.4		1160 ± 14.9		244 ± 7.1	
Third trimesters	48	493 ± 11.2 a		2444 ± 33.5 b		266 ± 7.6 c		19	177 ± 6.9		1677 ± 18.3		199 ± 6.8	
Overall mean	108	503.3 ± 12.4		2180.6 ± 28.4		286 ± 7.2		42	288.3 ± 7.9		1430.6 ± 24.6		189 ± 6.3	

a: Significant differences of P<0.05 ; Mean control IgG: (1287 ± 24.6)mg/dl

b: Significant differences of P<0.05 Mean control IgM: (186.6 ± 9.1)mg/dl

c: Significant differences of P<0.05 . Mean control IgA: (229.7 ± 14.6)mg/dl

Table (8) shows the results of concentration mg/dl for each of C3 , C4 in positive patients (pregnant women which suffering from UTIs) and also for negative patients (without bacterial growth) , according to the trimesters of pregnancy. In the case of positive patients the results appeared a rise in concentration level for C3 and C4 which the mean (204.3 ± 7.9) , (53 ± 2.8) respectively and C3 ,C4 for negative patients are (144 ± 6.7) , (32 ± 2.0) respectively, these results of (negative patients and positive patients) have significant differences at P< 0.05 for C3 and C4. Increasing in the level of each of concentrations C3 , C4 is indicates the presence of bacterial infections.

Table- 8: Means Concentration mg/dl of C3 and C4 Complement in positive and negative patient

Negative patient					Positive patient					Trimesters
C4		C3		No.	C4		C3		No.	
SD	mean	SD	mean		SD	Mean	SD	Mean		
29 ± 1.5		119 ± 6.2		10	54 ± 2.7 B		187 ± 8.4 A		23	First trimesters
33 ± 1.8		152 ± 7.8		13	49 ± 2.3 B		224 ± 8.9 A		37	Second trimesters
34 ± 2.3		161 ± 8.2		19	56 ± 3.0 B		202 ± 8.1 A		48	Third trimesters
32 ± 2.0		144 ± 6.7		42	53 ± 2.8		204.3 ± 7.9		108	Overall mean

The higher concentration of Immunoglobulines (IgG, IgM, IgA) were indicated that the Humarol Immune Response is stimulated after infection and the increase of Ab concentration in second and third trimesters lead to the secondary stimulation of Humarol Immune Respons, and these concentration may be increase according to the type of infection, if the bacteria is intercellular it always stimulate humarol I.R. more than cell-mediated I.R. , so stimulation of B-lymphocyte is occur. The increase in IgM, IgA occured in acute cases while IgG is increase in chronic case. (26). Infection in general caused increased in C3 component of the complement because this component is activated in classical and alternative pathway, while elevation of C4 component of the complement is occurred in classical pathway more than alternative pathway. UTI infection is mixed infection , it causes by different types of bacteria some of them producing Exo-Toxins while other produce Endo-Toxins, so alternative pathway

and classical pathway may be activated when bacterial toxin are produced by bacteria while classical pathway is activated by bacteria it-self. Complement component have important role in Inflammatory processes , so results of the study documented with (27). UTI infection attributed the increase of complement component production to the stimulation of the inflammatory mediators (28).

C-Reactive Protein

Results of CRP Titration of 150 serum specimens collected from pregnant women as shown in table (9) were 95 patients (63.3%) have a rise in the level of CRP Titration while other the 55 patients (36.7%) was normal (negative test). Results in table (10) reveals titration of CRP for pregnant women according to third trimesters, which is from 95 patients , 10 patients (10.5%) in first trimesters have very low CRP titer , while 10 patients (31.2%) from 32 patients (33.7%) in second trimesters of pregnancy appeared low concentration of CRP (6 mg/dl), but the higher elevation in the level of concentration of CRP occurred in patients 53 (55.8%) which in the third trimesters of pregnancy where the highest percentage of 21 patients (39.6%) titer is (12mg/dl) . The statistical analysis of titration CRP reveals that there is a high significant differences P<0.01 in the number of infections, represented in table (10). Results of statistical analysis of titration CRP according to trimesters of pregnancy reveals varying proportions of significant differences , which is the significant differences in the first and second trimesters at P<0.05 with mean (3.97) and (4.26) respectively, but the statistical analysis of CRP titer in the third trimesters of pregnancy shows higher significant differences at P<0.01 with mean (7.42) , this due to higher significant differences in Titration of CRP for each of titer (6,12,18,24) mg/dl especially in titer (6, 12) mg/dl. The increase in the concentration of (CRP) is to be more effective by months of pregnancy, whenever pregnancy with increased bacterial infections that mean increased in CRP titer which is considered as adefense against any bacterial infections Picklesimer *et al*., (29) and Challis et al., (30).

Table -9: CRP Titer according to the Trimesters of pregnancy.

Third Trimesters		Second Trimesters		First Trimesters		Titers Of
No. of patients	%	No. of patients	%	No. of patients	%	CRP Mg/dl
12	22.7	10	31.2	3	3.1	6
21	39.6	8	25	5	5.2	12
11	20.7	7	21.9	1	1.1	18
9	17	7	21.9	1	1.1	24
53	55.8	32	33.7	10	10.5	Total mean 95

Table -10: Number and percentage of CRP according to trimesters stage

Chi-square value	Third trimesters		Second trimesters		First trimesters		Titer of RP
	No. of patients	%	No. of patients	%	No. of patients	%	Mg/dl
7.55 **	12	22.7	10	31.2	3	3.1	6
7.81 **	21	39.6	8	25	5	5.2	12
6.46 **	11	20.7	7	21.9	1	1.1	18
6.22 **	9	17	7	21.9	1	1.1	24
7.61 **	53	55.8	32	33.7	10	10.5	Total percentage -95
---	--	7.42 **	--	4.26 *	–	3.97 *	Chi-square value

Conclusions:

- In the light of the previous chapter, the researcher has concluded the following points:
- Significant increase in the incidence of UTI infection in the third trimesters of pregnant women .
- *E.coli* had a predominance of UTIs in pregnant women (53%) , followed by Acinetobacter baumannii (23%), which is firstly isolated in UTI in pregnant women in Iraq. The other isolated bacteria were less frequent.
- High significant correlations were observed between the incidence of UTI infection with the age of pregnant women and with the frequent number of pregnancy.
- Serotyping of Pseudomonas aeruginosa indicated that O:11 is predominant in addition to others.
- High mean concentration for each IgG and IgM according to the trimesters of pregnancy , the mean of IgG in the first trimester is lower compared with the second and third trimesters. While the mean concentration of IgM at the first is higher than the IgM mean in the second and third trimesters and high in concentration level for C3 and C4.
- Titration CRP according to trimesters of pregnancy reveals varying proportions of significant differences, which is the significant differences in the first and second trimesters at $P<0.05$ but CRP Titer in the third trimesters of pregnancy shows higher significant differences at $P<0.01$.

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